Transrectal ultrasound in male urethritis

A F Ghaly, P M Taylor, B P Goorney, K R Haye

Abstract

***Objective*—To assess the prevalence of prostatic abnormalities in men with gonococcal and non-gonococcal urethritis using trans-rectal ultrasonic markers.**

***Design*—A case control study of patients attending a department of genitourinary medicine with symptoms of urethritis.**

***Setting*—Department of Genitourinary Medicine and Department of Radiology in Manchester Royal Infirmary.**

***Results*—A total of 42 patients were recruited to the study: 26 with urethritis and 16 controls. Of the 26 study patients, six were gonococcal, four chlamydial, two mixed gonococcal and chlamydia and nine non specific (no organisms detected). Of the 26 study patients, 16 had abnormal scans (61·5%), eight from the chlamydia group and eight from the non specific group. No abnormalities were found in the gonococcal and mixed group. Of the 16 control patients, five had abnormal scans (31·25%), three of these have had a past history of chlamydial urethritis.**

***Conclusion*—The prevalence of prostatic abnormalities in patients with non-gonococcal urethritis was significantly higher when compared with controls. The cause of these abnormalities is unclear, but is compatible with inflammatory changes within the gland.**

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Introduction

Urethritis is a common disorder in patients attending the Department of Genitourinary Medicine. In recent years transrectal ultrasound (TRUS) has become a valuable diagnostic aid in screening for prostatic malignancies.[1-3] A natural extension was the use of ultrasound to demonstrate other conditions in the prostate and seminal vesicles. The aim of this study was to assess the prevalence of prostatic abnormalities in men with gonococcal and non-gonococcal urethritis presenting to a Department of genitourinary medicine. This paper describes the relationship between prostatic abnormalities demonstrated by TRUS and the microbiological findings in patients with urethritis and asymptomatic controls.

Patients and methods

A case control study was carried out between June 1992 and March 1993. Twenty six patients (aged 18–39 years, mean 27) attending the STD clinic at Manchester Royal Infirmary with a clinical and microbiological diagnosis of urethritis were studied. Urethritis was defined as a clinical picture of urethral discharge supported by microbiological evidence of infection. Objective microscopic definition of urethiritis was the presence of cells greater than 5 polymorphonuclear leucocytes per high power (×1000) field in a Gram stained urethral smear. The microbiological evidence of gonorrhoea and chlamydia were based on the isolation of such organism from the relevant culture.

All patients, none of whom had received antibiotics for at least 2 months underwent full clinical assessment including rectal examination by a single clinician. None had symptoms or signs suggestive of previous or current prostatitis.

The symptoms of prostatitis included perineal pain, irritative voiding, ejaculatory pain and blood stained ejaculate. The signs of prostatitis was enlargement and tenderness. A past history of urethritis was based on microbiological data obtained from the patient's relevant notes.

The following investigations were performed on initial attendance: urethral smear and culture for *Neisseria gonorrhoeae*, urethral swab for *Chlamydia trachomatis* culture and isolation, two glass urine test, mid stream urine specimen for microscopy and culture and syphilis serology. A control group of 16 patients (aged 20–39 years, mean 28) was also studied. The controls were asymptomatic patients attending the clinic for review. They had no abnormal physical signs, had received no antibiotics in the previous 2 months, had no more than one previous STD which was adequately treated and no STD within the past 3 years. Following clinical and microbiological assessment, the patient was counselled by a single clinician (AG) and invited to participate in the study. Those consenting were referred for transrectal ultrasound.

TRUS was performed using an ACUSON 128 system with a dedicated 7·5 MHz transducer scanning in the longitudinal plane. All patients were examined in the left lateral decubitus position. The prostate was assessed for the presence of diffuse high or low echo foci (high density and mid range echoes), cysts (echo lucent zones), capsular thickening, concretions and ejaculatory duct calcification defined as punctate high echo areas casting an acoustic shadow and extra prostatic collections. These ultrasonic markers were similar to those used by Doble *et al* 1989.[4] However, only five markers were used out of the seven used by Doble (capsular irregularity and the peri-urethral zone irregularity were not

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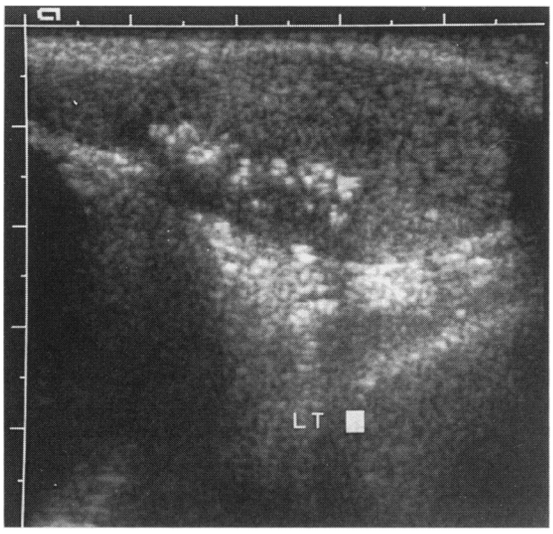

Figure Longitudinal transrectal ultrasound image of the left lobe of the prostate demonstrating extensive concretions.

recorded) (fig). The findings were recorded on hard copy and assessed blind to the patients clinical and microbiological findings. All examinations were performed by a single observer (PMT). The results of TRUS were withheld from the clinician until completion of the study.

Gonococcal urethritis were treated using ciprofloxcin 500 mg stat. Non-gonococcal urethritis were treated by oxytetracyclin 500 mg twice daily for two weeks. Test of cure was carried out one week after completion.

After completion of treatment, successful treatment was defined as resolution of symptoms and microbiological confirmation of cure (less than 5 polymorphonuclear leucocytes per high power field on a Gram stained urethral smear, and negative culture for *N gonorrhoeae* and *Chlamydia trachomatis*.) Patients were invited to provide semen for analysis and undergo a further TRUS; 10 patients agreed to this. Follow up TRUS was performed within 4 weeks of clinical and microbiological confirmation of cure. All the second TRUS were performed by the same observer (PMT) who compared the findings between the two scans.

Results

The two groups were comparable with respect to age (study group mean age 27 years, control group mean age 28). There were six patients from the West Indies in the study group, and five in the control group. The remainders were white Caucasian. Of the 26 study patients with urethritis, six were gonococcal, nine chlamydial, two mixed gonococcal and chlamydial and nine had no organism detected. Clinical details and findings on TRUS are outlined in the table.

Of the 26 study patients; 16 had an abnormal scan (61·5%), eight from the chlamydia group and eight from the non specific group. No scan abnormalities were detected of the gonococcal and mixed groups. Of the 16 control patients, five had an abnormal scan (31·25%); three of those have had past history of chlamydial urethritis.

The results demonstrate that the prevalence of TRUS abnormalities is significantly higher in the non-gonococcal urethritis group compared with the controls ($p < 0.05$ Chi square with Yates correction) either alone or in combination with chlamydia. However, there were significant differences between the study and the control groups in the sexual history. This was significant for the non-gonococcal group, 13/18 compared with the control group 5/16 ($p < 0.05$ chi squared, Yates correction).

There were no relapse of urethritis in the non-gonococcal group and none of the gonococcal patients had developed post gonococcal urethritis during the time of the study. No patients of either group failed to attend for follow up.

Seven of 10 patients who agreed to repeat TRUS and semen analysis showed persistent prostatic abnormalities (three from the chlamydia group and four from the non-specific group). The scan abnormalities present on the initial examination may have persisted on the second scan. These abnormalities were thickened capsule, high and low foci echoes.

Three (one from the chlamydia group and two from the non-specific group who had also persistent abnormalities) of the 10 showed bacterial infection on semen culture with polymorphonuclear leucocytes greater than 5 per high power (× 1000) field. The infecting organisms were, *Staphylococcus aureus*, *Escherichia coli* and *Staphylococcus albus*. These 3 patients were also found to be sub-fertile by WHO criteria on semen analysis (sperm

Table Clinical and ultrasound findings

No of patients	*Cause of urethritis*	*Past history of STD*	*Abnormal TRUS*	*High/low Foci*	*Concretions*	*Thickened capsule*	*Cysts*
16	Control	3 chlamydia* 2 non-gonococcal	5 (3 had previous chlamydia* 2 No STD)	4	1		
9	Chlamydia	4 NSU 1 chlamydia	8	2	5	3	
6	Gonococcus	1 non-gonococcal	0				
2	Gonococcus & Chlamydia	1 non-gonococcal	0				
9	NSU	6 NSU 2 chlamydia	8	2	1	1	4
42	Total	20	21	8	7	4	4

NSU—Non specific urethritis
STD—Sexually transmitted disease
TRUS—Transrectal ultra sound
*Chronic prostatic changes in chlamydia control

density less than 20 million per ml, sperm motility less than 60% and sperm morphology showing more than 60% abnormal forms).

Discussion

Investigation by trans-rectal ultrasound has been available for over 20 years, but only in the last few years have high frequency (5–7·5 MHz) high resolution transducers been developed for evaluation of the prostate gland. The appearances of the prostate at TRUS have been well described.[5] They are based upon zonal anatomy described by McNeill.[6] Three glandular zones (peripheral, central and transitional) and one non-glandular (fibromuscular stroma) can be identified. The transitional and central zones are heterogeneous and echo poor having similar TRUS appearances. The peripheral zone is of more uniform higher echogenicity. Between the peripheral and central zones lie the corpora amylacia which calcify with increasing age. Age related changes within the prostate gland are described but in view of the low mean age of the group studies, prostatic hypertrophy is unlikely to be a significant feature within this group.

Our studies indicate a high prevalence of prostatic abnormality in patients with non-gonococcal urethritis. Marked inflammatory changes can occur in the prostate gland without symptoms.[7] This highlights the problem in diagnosing chronic inflammatory change in the prostate. Bacterial culture of the ejaculate has been disappointing; the concentration of leucocytes in the secretory fluid is also unhelpful.[7] The Stamey procedure described by Mears and Stamey in 1966[8] can be helpful in diagnosing chronic abacterial prostatitis but is not totally reliable.[9 10] Clinical examination is limited because of relative inaccessibility of the prostate and the seminal vesicle.

Doble *et al* have indicated seven ultrasonic markers suggestive of prostatitis. These are high-density, mid range echoes, echo lucent zones, capsular irregularity, capsular thickening, ejaculatory duct calcification, periurethral zone irregularity. In his series there was low specificity of the high density and mid range echoes and low sensitivity of the remaining five markers. However, the detection of several markers within an individual's prostate is suggestive of chronic prostatitis.

In our study prostatic massage or biopsy were not performed. It is therefore difficult to draw any firm conclusion on the underlying pathology of these abnormalities. Some of these abnormalities may have been old changes. Almost all the patients with chlamydial or non-specific urethritis showed abnormality on TRUS. No abnormalities were seen in the patients presenting with gonococcal urethritis. We postulate that this is due to the natural history of gonococcus which results in early symptoms and prompt attendance at STD clinics. Although three of the patients with gonococcal urethritis had received treatment within the 24 hours prior to TRUS we think this is unlikely to have significantly affected the appearances on TRUS.

In view of the significant difference in the past history of urethritis in the two groups, it is possible that the high prevalence of previous urethritis in the non-gonococcal group is a source of bias to the TRUS.

The absence of abnormality in the gonococcal patients would exclude the presence of chronic prostatic changes in this group. Chlamydia infections are more indolent and morphological changes in the prostate have time to develop before the patients seek medical advice. The duration of symptoms in the gonococcal patients was between 2 and 7 days prior to attendance, in the non-gonococcal patients between 1 and 3 weeks.

It is possible that owing to the longer duration of symptoms, changes were observed in the non-gonococcal patients which had not developed in the gonococcal patients, imaged earlier in the natural history of the disease. It is interesting that no patient of the mixed group had an abnormal scan.

No post gonococcal urethritis developed in the studied group. This may be due to the short duration of the follow up. An alternative hypothesis is that the TRUS findings are the result of chronic changes within the gland. The finding of persisting abnormalities in three of the four chlamydia patients and four of the five NSU patients on follow-up examination may suggest resolved inflammation with fibrosis, although the numbers involved are small and a larger study with long term follow up is required to confirm this. The changes observed on TRUS were assessed qualitatively. Quantitative assessment was not performed and despite similar changes observed on follow-up scans, it was not possible to assess if the changes were resolving.

Chlamydial infection in females has been claimed to be responsible for most of the pelvic inflammatory disease which is associated with sub-fertility. Three of the 10 patients assessed following treatment had evidence of sub-fertility and all these patients showed persisting abnormality on TRUS. This is an interesting observation which may be a transient phenomenon related to the varied[11] appearance of possible prostatic inflammatory disease. Although these prostatic abnormalities were not supported by histopathological or microbiological evidence of inflammatory process, TRUS was able to provide an objective assessment of the prostate gland in these patients.

Our findings indicate that patients with non-gonococcal urethritis may have a high incidence of prostatic abnormality. Further longitudinal studies are needed to assess the significance of these abnormalities and whether these changes are reversible.

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